CLAIMS

What is claimed is:

1. A system for performing a remote plasma clean, the system comprising:

a chamber configured to generate activated species;

a processing chamber for processing substrates, the processing chamber located remotely from the chamber;

the processing chamber including at least one input port for introducing process gases into the processing chamber for processing substrates, and at least one input port for introducing activated species into the processing chamber for cleaning the processing chamber; and

a delivery system coupled to the chamber and coupled to the at least one input port for introducing activated species into the processing chamber;

wherein the delivery system has a conductance of at least about 40 liters per second when the conductance is measured with a processing chamber pressure of about 1 Torr and a RPC gas feed flow rate of about 2000 sccm.

2. The system of claim 1, wherein the chamber is further configured to operate at less than about 3 kilowatts.

3. The system of claim 1, wherein the at least one input port for introducing activated species into the processing chamber comprises an opening formed in a sidewall of the processing chamber.

4. The system of claim 3, wherein the at least one input port for introducing activated species into the processing chamber includes a viewport formed therein for enabling a user to view the interior of the processing chamber.

5. The system of claim 1, wherein the delivery system comprises a gas distribution manifold connected to the at least one port for introducing activated species, and an output tube connected to the chamber.

6. The system of claim 5, wherein the delivery system further comprises an isolation valve.

7. The system of claim 1, wherein the processing chamber comprises a first processing station for processing a first substrate and a second processing station for processing a second substrate.

8. The system of claim 7, wherein the at least one input port for introducing activated species into the processing chamber comprises a first input port spatially separated from a second input port, the first input port supplying activated species to the first processing station, and the second input port supplying activated species to the second processing station.

9. The system of claim 7, wherein the at least one input port for introducing process gases into the processing chamber comprises a third input port spatially separated from a fourth input port, the third input port supplying process gases to the first processing station, and the fourth input port supplying process gases to the second processing station.

10. The system of claim 9, wherein the processing chamber includes an exhaust port disposed between the third input port and the fourth input port for exhausting gases from the processing chamber.

11. The system of claim 3, wherein the processing chamber includes a susceptor, and the processing chamber is configured to flow at least a portion of the activated species to a region beneath the susceptor.

12. The system of claim 1, wherein the processing chamber further includes an exhaust system.

13. The system of claim 12, wherein the at least one input port for introducing process gases is coupled to the exhaust system to periodically reverse gas flow direction to draw activated species through the input port for introducing process gases and out of the processing chamber.

14. The system of claim 1, wherein the delivery system comprises an inner tube of a coaxial inject/exhaust assembly.

15. The system of claim 14, wherein the coaxial inject/exhaust assembly is located in a central portion of the processing chamber.

16. The system of claim 14, wherein the processing chamber includes a plurality of exhaust ports disposed around a peripheral portion of the processing chamber.

17. The system of claim 1, further including a susceptor support plate for supporting the susceptor.

18. The system of claim 17, wherein each of the plurality of exhaust ports are coupled to a flow channel formed in the susceptor support plate, the flow channels directing exhaust gases toward a central portion of the processing chamber and then toward an outer tube of a coaxial inject/exhaust assembly.

19. The system of claim 1, wherein the delivery system further includes an optical baffle disposed within a portion of the delivery system adjacent to the chamber, the optical baffle configured to substantially block line-of-sight exposure of downstream components of the delivery system from the chamber.

20. The system of claim 19, wherein the optical baffle is disposed within an output tube of the delivery system.

21. The system of claim 1, wherein the processing chamber is configured to ignite a second plasma from the activated species generated by the chamber such that the power coupled to the second plasma is less than about 800 watts.

22. The system of claim 1 further comprising a substrate transport chamber separated from the processing chamber via a door, the door to the substrate transport chamber configured to periodically open to allow activated species to clean the substrate transport chamber.

23. The system of claim 22 further comprising one or more substrate vacuum loadlocks separated from the substrate transport chamber via a door, the doors to the loadlocks configured to periodically open to allow activated species to clean the loadlocks.

24. The system of claim 1 further comprising a substrate transport chamber positioned adjacent to the processing chamber, wherein the delivery system is configured to provide activated species from the chamber to the transport chamber for cleaning the transport chamber.

25. The system of claim 24 further comprising one ore more substrate vacuum loadlocks connected to the substrate transport chamber, wherein the delivery system is configured to provide activated species from the chamber to the loadlocks for cleaning the loadlocks.

26. A system for performing a remote plasma clean, the system comprising:

a chamber configured to generate activated species;

a processing chamber for processing substrates, the processing chamber located remotely from the chamber;

wherein the processing chamber includes at least one input port for introducing process gases into the processing chamber for processing substrates;

a coaxial inject/exhaust assembly coupled to the processing chamber, the coaxial inject/exhaust assembly having an inner tube coaxially arranged within an outer tube;

a delivery system coupled to the chamber and one of the tubes of the coaxial inject/exhaust assembly, the delivery system configured to introduce activated species into the processing chamber for cleaning the processing chamber; and

an exhaust system coupled to the other tube of the coaxial inject/exhaust assembly, the exhaust system configured to exhaust process gases and activated species from the processing chamber.

27. The system of claim 26, wherein the delivery system has a conductance of at least about 40 liters per second when the conductance is measured with a processing chamber pressure of about 1 Torr and a gas feed gas flow rate of about 2000 sccm.

28. The system of claim 26, wherein the chamber is further configured to operate at less than about 3 kilowatts.

29. The system of claim 26, wherein the coaxial inject/exhaust assembly is located in a central portion of the processing chamber.

30. The system of claim 26, wherein the delivery system comprises an output tube connected to the chamber, and an inner tube of the coaxial inject/exhaust assembly.

31. The system of claim 30, wherein the delivery system further comprises an isolation valve.

32. The system of claim 26, wherein the processing chamber comprises a first processing station for processing a first substrate and a second processing station for processing a second substrate.

33. The system of claim 32, wherein the at least one input port for introducing process gases into the processing chamber comprises a first input port spatially separated from a second input port, the first input port supplying process gases to the first processing station, and the second input port supplying process gases to the second processing station.

34. The system of claim 26, wherein the processing chamber further includes a susceptor support plate disposed beneath the susceptor for supporting the susceptor.

35. The system of claim 26, wherein the processing chamber includes a plurality of exhaust ports disposed around a peripheral portion of the processing chamber.

36. The system of claim 35, wherein each of the plurality of exhaust ports are coupled to a flow channel formed in the susceptor support plate, the flow channels directing exhaust gases first toward a central portion of the processing chamber and then toward the outer tube of the coaxial inject/exhaust assembly.

37. The system of claim 26, wherein the at least one input port for introducing process gases is coupled to the exhaust system to periodically reverse gas flow direction to draw activated species through the input port for introducing process gases and out of the processing chamber.

38. The system of claim 26, wherein the delivery system further includes an optical baffle disposed within a portion of the delivery system adjacent to the chamber, the optical baffle configured to substantially block line-of-sight exposure of downstream components of the delivery system from the chamber.

39. The system of claim 19, wherein the optical baffle is disposed within the output tube of the chamber.

40. The system of claim 26, wherein the processing chamber is configured to ignite a second plasma from the activated species generated by the chamber such that the power coupled to the second plasma is less than about 800 watts.

41. The system of claim 26 further comprising a substrate transport chamber separated from the processing chamber via a door, the door to the substrate transport chamber configured to periodically open to allow activated species to clean the transport chamber.

42. The system of claim 41 further comprising a one or more substrate vacuum loadlocks separated from the transport chamber via a door, the door to the loadlock configured to periodically open to allow activated species to clean the loadlock.

43. The system of claim 26 further comprising a substrate transport chamber positioned adjacent to the processing chamber, wherein the delivery system is configured to provide activated species from the chamber to the transport chamber for cleaning the transport chamber.

44. The system of claim 43 further comprising a substrate vacuum loadlocks positioned adjacent to the transport chamber, wherein the delivery system is configured to provide activated species from the chamber to the loadlocks for cleaning the loadlocks.

45. A method of cleaning a processing chamber using a remote plasma source, the method comprising:

generating activated species from a cleaning gas in a chamber;

transporting the activated species through a delivery system from the chamber to an inlet port of the processing chamber;

flowing the activated species through the inlet port into the processing chamber for cleaning; and

exhausting the gases from the processing chamber through an exhaust port that is coaxially aligned with the inlet port.

46. The method of claim 45 further comprising the steps of:

generating a second plasma within the processing chamber from the activated species generated in the chamber;

measuring the intensity of at least one emission line from the second plasma with an optical detector, and

terminating the cleaning of the processing chamber in response to the intensity measured by the optical detector reaching a predetermined threshold.

47. The method of claim 46, wherein the step of generating the second plasma comprises coupling less than about 800 watts of power to the second plasma.

48. A system for performing a remote plasma clean, the system comprising:

a chamber configured to generate activated species;

a processing chamber for processing substrates, the processing chamber located remotely from the chamber;

the processing chamber including an input port for introducing activated species into the processing chamber for cleaning the processing chamber; and

a delivery system coupled to the chamber and to the input port for introducing activated species into the processing chamber;

wherein the delivery system includes a compound valve.

49. The system of claim 48, wherein the delivery system has a conductance of at least about 40 liters per second when the conductance is measured with a

processing chamber pressure of about 1 Torr and a gas feed flow rate of about 2000 sccm.

50. The system of claim 49, wherein the compound valve comprises:

a isolation valve configured to isolate the chamber from the processing chamber when the isolation valve in a closed position, and to allow the activated species to diffuse from the chamber to the processing chamber when the isolation valve is in an open position; and

a gate valve configured to selectively extend over the isolation valve when the isolation valve is in the open position to protect components of the isolation valve from the activated species.